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ONE PIECE SKATE CHASSIS

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BACKGROUND

1. Field of the Invention. This invention is directed to chassis for skates, in general, and to a chassis stamped and formed from a single piece of metal for in-line roller skates, in particular.

2. Prior Art. Roller skates and ice skates have been known for many years.

A recent innovation in roller skates is referred to as in-line skates wherein the wheels or rollers are arranged in-line one behind the other, typically, in groups of four. This arrangement creates a type of footwear which is more akin to an ice skate, than to a conventional roller skate. As a result, roller hockey has become a popular hobby, pastime and even professional sports activity.

The typical in-line skate includes a shoe or boot and an attached metal chassis for supporting the rollers. In the past, the metal chassis has been formed by machining a single block of metal to form the desired shape. Alternatively, the frame has been constructed by welding multiple pieces of metal together to form the frame. Of course, these chassis and methods of manufacture have been quite expensive wherein the skates become expensive.

SUMMARY OF THE INSTANT INVENTION

This invention is directed to a skate chassis including sole and heel flanges, which is formed of a single piece of material, typically metal blank stock, which is operated upon in a multiple step, stamping process. This process can include a progressive die technique. The blank stock is pierced, punched, formed, coined, and folded in various steps until a one piece chassis is produced.

Spacers for supporting axles and spacing wheels on the axles are integrally formed in the chassis during the coining

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(or extruding) operation.

Optional welding steps can be utilized in order to establish connections between strength imparting braces formed in the chassis.

BRIEF DESCRIPTION OF THE DRAWINGS

As ~~Figure 1 is a perspective view~~ of a skate chassis produced in accordance with the instant invention.

Figure 2 is a side elevation view of a skate chassis produced in accordance with the instant invention.

Figure 3 is a front end elevation view of a skate chassis produced in accordance with the instant invention.

Figure 4 is a back end elevation view of a skate chassis produced in accordance with the instant invention.

Figure 5 is a detail view of the ^{coined or} extruded spacer provided in a skate chassis produced in accordance with the instant invention.

~~FIGURES 6A-6C are views~~
~~Figure 6 is a plan view~~ of a representative formation of a skate chassis from a single piece of metal blank stock.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring now to Figure 1, there is shown a perspective view of a skate chassis 100 produced in accordance with the instant invention. In particular, the skate chassis is preferably designed for the so-called "in-line" skate which supports a plurality of skate wheels ^{W, seen in Figure 2} (not shown) which are aligned behind each other in a single line.

The chassis 100 comprises a pair of spaced apart, substantially parallel sides 101 and 102. The sides are integrally formed with a bottom 103. A front or sole mounting flange 104 and a rear or heel mounting flange 105 is integrally formed with side 101. Complementary mounting flanges 106 and 107 are integrally formed with side 102. The complementary flanges extend outwardly from the respective sides.

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One or more support braces 110 and 111 can be integrally formed with the respective sides 101 and 102. Similar braces 113 and 114 are formed at the rear of the chassis ~~although only brace 114 is visible in Figure 1~~. In a preferred embodiment, the support braces can be welded together at a joint 112. Braces 113 and 114 can be welded, as well, as described hereinafter.

A plurality of axle spacers 115 are formed on the inner surface of each of the sides 101 and 102, respectively. The axle support holes 120 are formed, at least to some degree, axially through the spacers 115. Thus, the number of spacers 115 is dictated by the number of axles to be supported in the chassis 100.

Typically, the spacers 115 are extruded from the side material. (This process is sometimes referred to as coining.) The technique of forming the spacers 115 integrally with the sides of the chassis avoids the multi-part, multi-step process used in the prior art wherein separate spacers are inserted into the axle support holes 120 in the chassis.

The chassis 100 includes a plurality of apertures or holes 130 and 131 in the ^{sole and heel} mounting flanges 104 ^{106 and 105, 107, respectively} ~~107~~ for receiving fasteners (e.g. rivets, bolts or the like) used to mount a shoe or a boot ^B to the chassis 100. ^{Embossments} ~~Other embossments~~ 150 and 151 can be included in the chassis for cosmetic and/or strengthening purposes.

Referring now to Figure 2, there is shown a side elevation view of a skate chassis 100 produced in accordance with the instant invention. In this view, the side 102 is depicted. (Side 101, seen in Figure 1, is similarly configured.) The rear of the skate chassis is shown on the right in Figure 2. The heel support flange 107 is integrally formed at the top rear edge of side 102. The sole support

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flange 106 is integrally formed at the top, front edge of side 102.

The support brace 111 is integrally formed at the top, middle edge of side 102. A complementary support brace 110 is formed with side 101 as shown in Figure 1. It is contemplated that support brace 110 or 111 can be appropriately dimensioned to fully extend between sides 101 and 102. However, in the preferred embodiment, support braces 110 and 111 are about equal in dimensions and are welded together in joint 112 at the ends thereof about midway between sides 101 and 102.

The support brace 113 is integrally formed at the top, back edge of side 102. A complementary support brace ¹¹⁴~~110~~ is formed with side 101 as shown in Figure 1. It is contemplated that support brace 114 or 113 can be appropriately dimensioned to fully extend between sides 101 and 102. However, in the preferred embodiment, support braces 114 and 113 are about equal in dimensions and are welded together in joint 177 at the ends thereof about midway between sides 101 and 102.

Embossments 150, 151 and 152 are shown in Figure 2. The number, placement and configuration of these embossments can be varied as desired. One or more of the embossments may be omitted, if desired. The embossments are intended to provide strengthening (as well as esthetic) characteristics to the chassis 100 but the specific design is not critical.

The apertures 130 and 131 are provided through the flanges 106 and 107, respectively. Appropriate fasteners, such as rivets, screws or the like (not shown), are passed through these apertures to fasten a ^{shoe}~~show~~ or boot ^B~~(not shown)~~ to the chassis 100.

In addition, one or more gussets 141 are formed between flange ¹⁰⁶~~107~~ and side 102. Similarly, gussets 142 are formed between flange ¹⁰⁷~~106~~ and side 102. The gussets are used

in order to provide additional strength for the chassis. Of course, similar gussets are provided on the other side of the chassis, as well.

The spacers 115 are formed in the side 102 by extruding or coining, as noted supra. The spacers are, in effect, small ^{truncated} conically shaped projections which extend inwardly toward the center of the chassis and are located on the opposite surface of side 102. The apertures 120 are axially formed in the spacers 115 and are adapted to receive the wheel supports or axles in the assembly of the skate.

Referring now to Figure 3, there is shown a back end elevation view of the chassis 100. In this case, the back end is consistent with the ^{right} ~~left~~ end of the chassis 100 as shown in Figure 1.

The view in Figure 3 shows the sides ~~101 and 102~~ spaced apart but integrally formed with bottom 103. The support braces 110 and 111 are integrally formed with sides 101 and 102, respectively. The braces 110 and 111 are bent toward each other and, preferably, joined together in a welded joint 112.

The rear flanges 105 and 107, as well as the front flanges 104 and 106, are formed integrally with sides 101 and 102, respectively. The flanges are bent outwardly relative to the sides in this embodiment.

In this embodiment, the upper ends 101A and 102A of sides 101 and 102, respectively, are bent inwardly toward each other to form an "A-frame" style chassis. Support brackets 113 and 114 are joined together at a welded joint 177. The upper ends of the sides are bent together as shown in Figure 3 to provide one style of frame.

The spacers 115 extend inwardly relative to the sides 101 and 102. The spacers assist in the proper spacing of the skate wheels when they are assembled with the chassis.

Referring now to Figure 4, there is shown a back end elevation view of another embodiment of the chassis 100. In this case, the back end is consistent with the right end of the chassis 100 as shown in Figure 2.

The view in Figure 4 shows the sides 101 and 102 spaced apart but integrally formed with bottom 103. The support braces 110 and 111 are integrally formed with sides 101 and 102, respectively. The braces 110 and 111 are bent toward each other and, preferably, joined together in a welded joint 112.

The rear flanges 105 and 107, as well as the front flanges 104 and 106, are formed integrally with sides 101 and 102, respectively. The flanges are bent outwardly relative to the sides in the preferred embodiment.

In this embodiment, the sides 101 and 102, respectively, are substantially parallel to each other and for the "square-frame" style chassis. Support brackets 113 and 114 are joined together at a welded joint ~~117~~¹¹⁷. This style of frame and the A-frame style shown in Figure 3 are two examples of frame configuration. Other configurations are also contemplated even though not specifically shown and/or described herein.

The spacers 115 extend inwardly relative to the sides 101 and 102. The spacers assist in the proper spacing of the skate wheels when they are assembled with the chassis.

Referring now to Figure 5, there is shown a detailed view of a spacer 115. As described supra, each spacer 115 is extruded or coined in the side 101 or 102 as appropriate. In particular, the spacer 115 takes a generally ^{truncated} conical configuration of material on the inner surface of the relative side. The spacer 115 is defined to include a central axial aperture 120 which has the appropriate diameter to engage and/or interact with the axle 501¹ which supports the skate wheel ~~510~~ when the skate is assembled. Typically, the spacer is, effectively,

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countersunk on the exterior of the respective chassis side. The countersunk configuration can be advantageously used to accommodate a flat head screw 502 (and/or axle ~~500~~⁵⁰¹) in order to provide a smooth exterior surface for the assembled skate. Of course, carriage bolts or screws with other head configurations can be used, if desired.

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Referring now to Figure 6, there is shown a representative process for forming the one piece skate chassis 100. In this embodiment, the input material or blank is in the form of rolls or sheets of metal, i.e. aluminum, stainless steel, or the like, about 10 to 12 inches wide and about 1/8" thick.

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The blank stock 600 is fed into the stamping and forming apparatus (not shown) where it is stamped, cut and formed. The process can take several discrete steps and/or it can be accomplished by use of a progressive die. Typically, in the first step, i.e. Step 1, the general outline of the chassis is formed. Also a plurality of relatively small holes ~~181~~^{130, 131} are punched through the blank 601. These holes become the mounting holes for receiving the rivets or other fasteners for securing a boot or a shoe to the completed frame as described above.

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Likewise, several (typically eight) axle holes 200, arranged in pairs, are punched through the blank. These holes are used to receive the axles for the wheels of the assembled skate.

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Also, several large holes 175 or cutouts are punched through the blank 601 adjacent to and intermediate related pairs of axle holes 200. The holes or cutouts 175 are used to form the openings through which the wheels of the assembled skate protrude.

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Some or all of the cuts and stampings can be accomplished concurrently. That is, the various stamping procedures can be accomplished in one or several steps depending upon the

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type of stamping equipment utilized. For example, the shape of the front and back ends of the sides 101 and 102 can be formed at Step 1.

5 In another step such as Step 2, embossments 150 can be made in the blank 602 adjacent to the axle holes 200. These areas of the blank will become the sides 101 and 102 of the assembled frame. These embossments can take any shape or configuration desired. The embossments are, generally, intended to provide strengthening characteristics by including ribs, 10 grooves, ridges or the like. The shapes of the embossments can be circular, rectilinear, elongated ribs or the like to form a desired configuration and can provide design advantages.

15 In addition, at a convenient time in the process, for example during Step 2, the axle holes 200 are extruded, coined or otherwise formed into short ^{truncated} cylinders or cones 115 which extend from the surface of the blank. These cones or cylinders will ultimately be disposed within the formed chassis and provide integrally formed spacers for locating the wheels within the assembled skate.

20 Once the desired shape has been stamped and/or punched into the blank, the forming of the chassis 100 is initiated. The forming process, as shown in Step 3, typically, begins with a wiping or forming operation wherein the spacer tabs 110 and 111 are bent upward and the boot support flanges 104-107 are 25 bent downward. (Of course, these directions are relative so long as the bends place the respective components in the proper position for the finalized chassis configuration.)

30 In Step 4, the sides of the chassis 101 and 102 are formed by bending or folding them upward relative to the blank. This operation forms a generally U-shaped channel comprising the sides 101 and 102 along with the bottom 103. At this time the spacer tabs 110 and 111 are formed toward each

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other and the support flanges 104-107 are bent away from each other. (Of course, it is contemplated that in some embodiments, the flanges 104-107 may extend toward each other.)

Once the folding or bending has been accomplished, the related spacer tabs 110 and 111, as well as spacers 113 and 114, can be welded together to form a secure, sturdy support structure. The spacer tabs 110, 111, 113 and 114 operate to provide rigidity to the U-shaped chassis. The tabs (or braces) keep the sides spaced apart and also joined together.

In the event that the process was conducted as a series of steps on a single sheet or a roll of material with a plurality of blanks joined together by a connector tongue ^{as shown in Figure 650,} for example, the blanks will be separated. The separation usually occurs prior to the welding step, if appropriate.

Likewise, the axles and wheels are assembled to the chassis. Thereafter, the shoes or boots are also assembled to the chassis. At this juncture, an in-line skate with a strong, reliable chassis is completed. The chassis is relatively inexpensive to fabricate whereby the costs of making the in-line skates is reduced.

Thus, there is shown and described a unique design and concept of one piece skate chassis. While this description is directed to a particular embodiment, it is understood that those skilled in the art may conceive modifications and/or variations to the specific embodiments shown and described herein. Any such modifications or variations which fall within the purview of this description are intended to be included therein as well. It is understood that the description herein is intended to be illustrative only and is not intended to be limitative. Rather, the scope of the invention described herein is limited only by the claims appended hereto.